Evaluating Surface Water Beneficial Use in Butte

A Proposal Submitted to the Montana DNRC/BNRC

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Submitted by:

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Executive Summary

This project is to assess the surface water in the designated Butte area for the beneficial public use. The project will be accomplished in three phases. In the phase I, surface water bodies in the study area will be identified. In the phase II, field sampling of water, sediment, and soil samples will be conducted to characterize the surface waterbodies from the point of view of their beneficial use for the public. In the phase III, criteria will be developed to rank the surface water bodies for their beneficial use and selected ones with low cost beneficial use will be implemented. The cost of phase I is $13, 712, phase II is $164,572 and the cost of phase III is $121,366 for a total of $299,650. The project will be managed by Dr. Kumar Ganesan, Professor of Environmental Engineering. The time line is June 15, 2015 to December 2017. Three final reports will be deliverable to DNRC/BNRC for the entire project, reports will be submitted at the end of each phases.

Project Goal

The goal of the project is to determine maximum feasible beneficial use of surface water bodies in Butte for the general public.

Long Term Objective

The overall objective of this project is for developing Water Bodies in Butte to meet maximum feasible public use from practical and economic viewpoints to improve the quality of life in Butte.

This work will be completed in three phases. Phase one involves identification of surface water for the study. Phase II will involve sampling and analysis along with data interpretation. Phase III will prioritize the surface water bodies for the beneficial use.

Water Bodies to be evaluated include: 1) Grove gulch including the pond; 2) Pond at Kaw Avenue and three additional ponds along the Blacktail creek; 3) The fish pond at the Continental drive including the nearby creek 4) Surface water that reaches Silver Bow Creek or the Blacktail creek north of the creek with eastern boundary of Father Sheehan park to the western boundary of west elementary school; and 5) The pond at the centennial avenue by the roofing company.

Phase I: Identification of Surface Water Sources in Butte Study Area

The phase I of this project involves four different tasks**.**

Task 1.1: Analysis of Existing Data: This task will focus on gathering and analyzing existing data that are available. A preliminary assessment of the available water quality data on these sites of interest will be performed. A short draft report will be prepared summarizing work completed in this task.

Task 1.2: Identification and Data Assessment: Following the task 1.1study, the needs of the surface water bodies in question will be identified based on the analysis of existing data. Old and current maps will be used to fill in the data gap for the surface water.

Task 1.3: Field Visit: Site visit and walk through is the focus of this task. The study areas will be visited and additional needed information will be gathered. At the end of this task, pictures with GPS locations will be provided.

Task 1.4 Report Writing: A summary report will be produced based on the identification of the surface water bodies and the analysis performed. A master Table will be developed with the names of the surface water body, location and other comments along with the source of information. This Table will be used as a master data base for the surface water study in the Phase Ii and III of this project. The report also will include necessary maps to locate the specified water bodies.

Phase II: Field Sampling and Assessment of Surface Waters in Butte Study Area

The phase II of this project has four different tasks.

Task 2.1 Selections of Sites for Field Campaign: Based on the information gathered in the Phase I report, discussions with the interested parties including BNRC/DNRC, the details for this phase II study will be determined. According to the results of the discussions, the sites will be selected and the sampling plan will be developed for a field campaign.

Task 2.2 Sampling Campaign: The sampling campaign consists of collecting samples from locations and time as pre-determined (based on Phase I report and in discussion with DNRC/BNRC) locations. The sampling will be conducted following the needed protocols in sampling and sample preservation to achieve reliable and consistent results. Bulk of the samples, about 80 %, will be sent to a commercial laboratory for analysis while remaining samples will be analyzed at the Environmental Engineering Analytical Laboratory at Montana Tech as part of the thesis research work of involved graduate students. The results of the analytical data will be evaluated to derive meaningful information to help understand the beneficial use of surface water.

Task 2.3 Performance Evaluation: Water quality data will be compared with the DEQ standards for the respective bodies of water where samples were collected. If there are no direct standards available for comparison, an attempt will be made to draw information from other regions or other sources. The location of the site, the quantity of water in question, and its potential public beneficial usage are the factors included in determining the beneficial public use of the water body.

Task 2.4: Preparation of Phase II Report: The report will include the water quality, quantity, and soils data from the field campaign. The data will be analyzed and organized in an easy to follow format with analytical results of the water, soil and the sediment samples with specific locations and sampling

conditions in tabular forms for future references. A discussion on the potential beneficial use opportunity will also be included to help the phase III work.

Phase III: Development of Beneficial Use Options and Implementing Low Cost Systems

The phase III of this project has five different tasks.

Task 3.1: Developing Criteria: Based on the results from Phase II project, the sites will be ranked for their potential to consider further development of the sites for the public use. A tentative list of criteria for the ranking includes but not limited to: 1) the water quantity and quality; 2) the location and population that may benefit from the development; 3) the cost of development and long term maintenance; 4) and the quality of recreational use of the water body (fishing vs swimming vs aesthetics vs other recreational activities). Additional criteria and weightage will be determined based on the discussions with the BNRC/DNRC including other interested parties.

Task 3.2: Identification for Further Evaluation: This task will identify the projects that need further evaluation and engineering analysis based on Task 3.1 and Phase II recommendations. Also community support and integration of new beneficial use of the water bodies with existing recreational facilities and its easy public accessibility and easy maintenance will be evaluated.

Task 3.3 Potential Site Enhancement Engineering: This task will involve engineering assessment of site enhancement. This includes excavation and soil removal, soil replacement, soil amendments and other options. Based on the results of Task 3.1 and 3.2 specific sites that may show promise will further be evaluated from an engineering view point for its feasibility for public use.

Task 3.4: Cost Analysis and Plant of Action: This task involves recommending a plan of action and site enhancement plan to achieve high public use potential at the least cost.

Task 3.5: Final Report: The phase III report to the BNRC/DNRC will include the options for maximizing feasible beneficial public use of surface water to the Butte Community. It will also include the reports of phase I and phase II.

Preliminary Sites and Sampling Strategy:

Site Name	# of water samples	# of soil/sediment samples
Pond @Kaw	15	9
Ponds along BTC and BTC	45	18
Silver Bow Creek	15	9
Grove Gulch	35	18
MSD	15	9
Fish Pond	15	9
Creek by Fish Pond	15	9
Other ponds and surface water	30	9
Total	185	90

Cost Estimate for Phase I to Phase III

Phase I Tasks	Cost $	Time Frame	Product
1.1 Existing Data Analysis	$2,000	June 8-20 2015	Review of existing information and data
1.2 Data Gap analysis	$3,000	June 22-30, 2015	Specific Sites
1.3 Site visit and walk through including GPS locations and Photos of current situations	$2,712	July 1-10, 2015	Site visit to all sites
1.4 Report including a master Table, maps and photos.	$6,000	July 6-17, 2015	Report preparation, maps and location photos.
Total for Phase I	$13,712		
Phase II Tasks			
2.1 Selection of sites for further sampling for water quality soil and sediment characterization	$6,000	July 2015-August 2015	Identification of selected sites for further sampling and development of sampling strategy in discussion with BNRC
2.2 Field campaign includes sampling for water quality, sediment characterization and soil analysis	$144,572	August 2015-September 2016	Field Work and Site Enhancement
2.3 Performance Evaluation of surface water in the selected sites based on water quality and quantity, site location, accessibility	$8,000	September 2016-December 2016	Ranking of the surface water sites for further evaluation for its beneficial use
2.4 Preparation of Phase II Report to BNRC/DNRC	$ 6,000	January –March 2017	Phase II Final Report
Total for Phase II Tasks	$164,572		Cost of Phase II only
Phase III Tasks			
3.1 Criteria development for Ranking	$6,000	April 2017	Identify factors to govern the criteria and develop weightage and ranking system
3.2 Identification of projects for further consideration	$9866	May 2017	Surface water that warrants further consideration
3.3 Engineering site enhancements	$8,500	June 2017	Recommending potential engineering enhancements to make the surface water for beneficial use
3.4 Plan of Action and small project implementation and Recommendation	$90,000	July –October 2017-	Implementing simple engineering action items
3.5 Phase III report	$7,000	Nov-Dec, 2017	Final report
Total cost of Phase III	$121,366		Final report on the Phase III accomplishments

Evaluating Surface Water Beneficial use in Butte: Budget Detail			
Personnel	**Salary ($/H)**	**Time (Hours)**	**Salary ($)**
B. Drury	76.9	22	1691.8
R. Nagisetty	51.3	22	1128.6
G. Craig	15	280	4200
K.Ganesan	76.9	30	2307
Benefits Student @(10%)			360
Benefits Faculty @ (25%)			1281.85
Sub Total			10969.25
IDCs (25% of salaries + benefits)			2742.31
Total			13711.56
B.Drury	79.2	120	9504
R.Nagisetti	52.9	180	9522
K.Ganesan	79.2	250	19800
Grad Student	15	2080	31200
Sample analysis	$75	275	20625
Chemical and supplies			10000
Benefits: faculty at 25%			9706.5
Student Benefit at 3%			7800
Travel and Miscellaneous			13,500
IDC at 25%			32914.375
Total			164,572
B.Drury	81.6	80	6528
R.Nagisetti	54.5	100	5450
K.Ganesan	81.6	120	9792
Grad Student	15	1040	15600
Contracted Service			50000
Benefits: faculty at 25%			5442.5
Student Benefit at 3%			3900
Travel and Miscellaneous			3,500
IDC at 25%			25053.12
			121,366